a heater mounted on said substrate such that said heater is thermally coupled to the interior of the vessel, said heater being able to be actuated to add heat to the surface of the substrate thermally coupled to the interior of the vessel, and

a sensor mounted on said substrate in proximity to said heater such that discrete elevations of the interior of the vessel are thermally coupled to corresponding longitudinal portions of said sensor to generate an electrical signal defining a temperature signal, said correspondence being incrementally continuous such that the elevations corresponding to said portions of said sensor increase from one to the other of the ends of said sensor, said sensor being able to be actuated to detect the temperature in the vessel in proximity to the sensor indicative of the temperature detected by said sensor, said sensor having a vertical dimension sufficiently large such that said temperature signal will vary in proportion to said longitudinal portion of said sensor thermally coupled to the liquid;

B1 cont

a processor electrically connected to said sensor for receiving said temperature signal after actuation of said heater, said processor being programmed to use said temperature signal to calculate the elevation of the upper surface of the liquid in the vessel thereby to generate an electrical signal defining an elevation signal indicative of the elevation of the liquid upper surface relative to the lower end of said sensor;

an interface electrically connected to said processor for receiving said elevation signal for use as the basis for communicating to the user the elevation of the liquid upper surface; and

a power supply electrically connected to said heater, sensor, processor, and interface,

wherein said sensor is defined by an intermediate sensor, said system further comprising: an upper sensor mounted on said substrate adjacent to the upper end of said intermediate sensor; and a lower sensor adjacent to the lower end of said intermediate sensor, said upper and lower sensors being thermally coupled to the interior of the vessel to detect the respective temperatures therein in proximity to said upper and lower sensors, said upper and lower sensors being able to be actuated to produce respective electrical signals defining temperature signals indicative of the respective temperatures detected by them, said upper and lower sensors each comprising a potentiometer wherein the resistance to electrical conductivity of each of said upper and lower sensors varies in proportion to the respective temperatures detected by them, said temperature signals of said upper and lower sensors being equal to said respective resistance values thereof, said processor being further programmed to calculate the distance between said lower sensor and the liquid upper surface according to the following equation:

B1 Con't

$$l = \frac{R_i - R_{vp}}{R_{lq} - R_{vp}}$$

where l = longitudinal fraction of said intermediate sensor below said liquid upper surface;

R_i = resistance of said intermediate sensor;

R_{vp} = resistance of said upper sensor when exposed to vapor only; and

R_{lq} = resistance of said lower sensor when exposed to liquid only,

B1 Cont'd

said processor being further programmed to calculate the vertical component of "l" for use as the basis for said generation of said elevation signal.

7. (Twice Amended) A system for detecting the level of liquid in a vessel, comprising:

B2 Cont

a detector assembly including

a thermally conductive substrate,

a heater mounted on said substrate such that said heater is thermally coupled to the interior of the vessel, said heater being able to be actuated to add heat to the surface of the substrate thermally coupled to the interior of the vessel, and

a sensor mounted on said substrate in proximity to said heater such that discrete elevations of the interior of the vessel are thermally coupled to corresponding longitudinal portions of said sensor to generate an electrical signal defining a temperature signal, said correspondence being incrementally continuous such that the elevations corresponding to said portions of said sensor increase from one to the other of the ends of said sensor, said sensor being able to be actuated to detect the temperature in the vessel in proximity to the sensor indicative of the temperature detected by said sensor, said sensor having a vertical dimension sufficiently large such that said temperature signal will vary in proportion to said longitudinal portion of said sensor thermally coupled to the liquid;

a processor electrically connected to said sensor for receiving said temperature signal after actuation of said heater, said processor being programmed to use said temperature signal to calculate the elevation of the

upper surface of the liquid in the vessel thereby to generate an electrical signal defining an elevation signal indicative of the elevation of the liquid upper surface relative to the lower end of said sensor;

an interface electrically connected to said processor for receiving said elevation signal for use as the basis for communicating to the user the elevation of the liquid upper surface;

B2 Cont

a power supply electrically connected to said heater, sensor, processor, and interface,

wherein said sensor is defined by an intermediate sensor, said system further comprising: an upper sensor mounted on said substrate adjacent to the upper end of said intermediate sensor; and a lower sensor adjacent to the lower end of said intermediate sensor, said upper and lower sensors being thermally coupled to the interior of the vessel to detect the respective temperatures therein in proximity to said upper and lower sensors, said upper and lower sensors being able to be actuated to produce respective electrical signals defining temperature signals indicative of the respective temperatures detected by them, said upper and lower sensors each comprising a potentiometer wherein the resistance to electrical conductivity of each of said upper and lower sensors varies in proportion to the respective temperatures detected by them, said temperature signals of said upper and lower sensors being equal to said respective resistance values thereof, said processor being further programmed to calculate the distance between said lower sensor and the liquid upper surface

according to the following equation:

$$l = \frac{R_i - R_{vp}}{R_{lq'} - R_{vp'}}$$

Where l = number of increments between a lower end of said intermediate sensor and the liquid upper surface;

L = total number of increments between an upper end and said lower end of said intermediate sensor (any number of increments are possible, higher number increases resolution of calculation and the actual count is arbitrary and determined only by resolution requirements);

R_i = resistance of said intermediate sensor;

R_{vp} = resistance of said upper sensor without scaling;

$R_{vp'}$ = resistance of said upper sensor at the observed temperature when exposed to vapor only, scaled by dividing by the total number of increments; and

$R_{lq'}$ = resistance of said lower sensor at the observed temperature when exposed to liquid only, scaled by dividing by the total number of increments;

said processor being further programmed to calculate the vertical component of "l" for use as the basis for said generation of said elevation signal.

B7 Cont'd